SD11
.A1
A42
no.189

QUERCUS

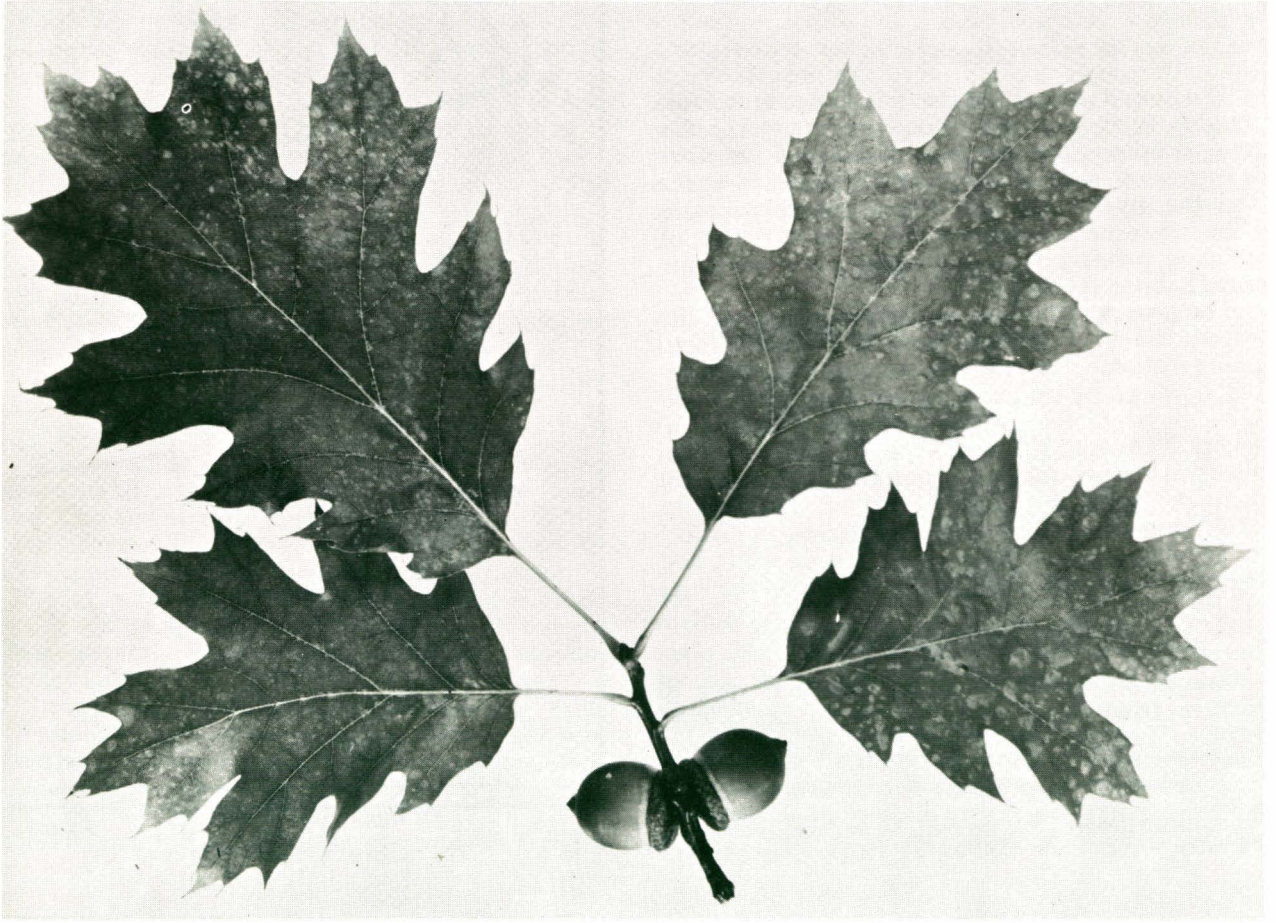
(oaks)

Oaks (*Quercus*) are the most important and most widespread hardwood trees in the north temperate zone, with about 300 species, including some shrubs. More than 500 have been named, but many probably are varieties or hybrids. Oaks are widespread across North America and Eurasia, extending south in tropical mountains to Cuba, Colombia, northern Africa, and Indonesia. The United States has about 58 of tree size and perhaps 10 more of shrub size. Twenty of the native tree species are considered important in management of forest stands.

The oaks are deciduous or evergreen. Winter buds, clustered at the ends of twigs, are composed of many overlapping scales. The short-petioled leaves are alternate in 5 rows, and are of various shapes, lobed, toothed, or entire, thin or leathery, mostly with prominent veins.

Minute flowers are borne in early spring with the leaves, mostly lateral, with male and female flowers on the same tree (monoecious). Male flowers are in clustered drooping, slender, yellowish catkins and the female flowers solitary or few, and greenish. The fruit is an acorn (nut), which matures in 1 or 2 years and sheds soon afterwards in autumn. The short-pointed acorn has a hard shell, a cup of small overlapping scales, and a seed, usually bitter.

The native oaks are classified into 2 subgenera. Red or black oaks (subgenus *Erythrobalanus*) have leaves with apex and lobes bristle-tipped, acorns maturing the second year, bark usually blackish and furrowed, and heartwood porous with vessels open. White oaks (subgenus *Quercus* or *Lepidobalanus*) have leaves with apex and lobes not bristle-tipped, acorns maturing the first year, bark usually light gray and scaly, and heartwood less porous with vessels closed by outgrowths (tyloses).



F—490720

munks, and squirrels. During some years the entire crop is eaten.

Seedling development.—Although large acorn crops are produced every few years, natural reproduction by seed is usually scarce, partly because of the inability of the radicle to penetrate the heavy sod on which the acorns frequently fall.

The best natural seedbed for Oregon white oak is moist soil covered with an inch or more of leaf litter. Germination is hypogeous, and the seed requires no pretreatment to break dormancy. Germination occurs in the late fall or early spring, and the germination percent usually is high. The juvenile root penetrates moist mineral soil quickly and deeply, but seedlings sometimes succumb to moisture shortage in the summer. Competition from plants, grazing, trampling, and grass fires also cause deaths (*5*).

Height growth, except in the seedling stage, is slow. Tolerance to shade is greater in its youth than at maturity (*5*).

Vegetative reproduction.—Vegetative propagation of all oaks is considered difficult; and no instances of layering, rooting of cuttings, or grafting have been reported for Oregon white oak. Grafting has been successful on many white oaks (*4*) and vegetative propagation of Oregon white oak by this means appears to be possible. Stumps of Oregon white oak sprout vigorously and provide the surest means of natural regeneration.

Sapling Stage to Maturity

Growth and yield.—Growth from the sapling stage to maturity is very slow. At best, the trees do not reach 100 feet in height; they seldom average more than 70 feet on the best sites in a life span that may last 500 years. Diameters at 250 years old are seldom more than 3 feet.

Volumes per acre in pure stands at various ages and sites are not known. An 80-year-old stand containing 160 trees 3.6 inches and larger in diameter at breast height per acre was estimated to have a volume of about 15 cords per acre.

Reaction to competition.—Relative tolerance of Oregon white oak is intermediate (*1*), but the tree is also considered intolerant by some.[3] It usually dies quickly when overtopped by Douglas-fir, although some trees have lived for 20 years after being overtopped (*5*).

The tree is usually subclimax, becoming climax only on dry, rocky southerly exposures. The present distribution of stands in the Willamette Valley indicates that Douglas-fir has generally invaded sites previously occupied by Oregon white oak. Some extension of oak stands into valley grasslands is also apparent (*3*).

[3] Keniston, R. Personal communication. Oreg. State Univ., Corvallis, Oreg. 1956.

Principal enemies.—Oregon white oak is damaged by many insects. The western oak looper (*Lambdina fiscellaria somniaria*) may defoliate it, but usually causes no permanent damage. The California tent caterpillar (*Malacosoma californicum*) and the blue-sided tent caterpillar (*M. constricta*) also are defoliators. Numerous cynipids (gall wasps) attack the twigs and leaves of white oak, each causing galls of characteristic sizes and shapes. Some cause conspicuous twig killing by forming masses of galls between the bark and the wood, thus blocking circulation. However, none of the insect pests of this oak are considered serious, and the killing of Oregon white oak by insects is probably uncommon.

The fungi attacking Oregon white oak includes 31 species. Of these, all but six are saprophytic.[4] A pest that is common south of latitude 45°20′, but rare or absent farther north, is the hairy mistletoe (*Phoradendron villosum*), which inhibits growth and sometimes kills the tree. The two major decay fungi are shoestring root rot, *Armillaria mellea*, and a trunk rot, *Polyporus dryophilus*. Oak mildew, *Microsphaera alni*, is a common foliage disease.

RACES AND HYBRIDS

Three natural hybrids are reported: *Quercus ×eplingii* (*Q. douglasii* × *garryana*); *Q. subconvexa* (*Q. durata* × *Q. garryana*); and *Quercus ×howellii* (*Q. dumosa* × *Q. garryana*) (*7*). Racial variations include a shrublike form of *Quercus garryana* found on the shores and islands of Puget Sound and in an area near Klamath Falls, Oreg. Acorns and leaves of Brewer oak (*Q. oerstediana*), a small to large spreading shrub occurring on the west slopes of the Sierra Mountains in California, are similar to those of Oregon white oak. It has been described as a variety of *Q. garryana*, but it also is considered a distinct species.

Revised from "Silvical Characteristics of Oregon White Oak," by Roy R. Silen. U.S. Forest Serv. Pacific Northwest Forest and Range Expt. Sta. Silvical Ser. 10, 13 pp. 1958.

LITERATURE CITED

(1) Baker, Frederick S.
1949. A revised tolerance table. Jour. Forestry 47: 179–181.

(2) Bowerman, M. L.
1944. The flowering plants and ferns of Mount Diablo, California. 290 pp. Gillick Press, Berkeley, Calif.

[4] Wright, E., and Childs, T. Personal communication. Pacific Northwest Forest and Range Expt. Sta., Portland, Oreg. 1956.

(3) Habeck, James R.
1961. The original vegetation of the Mid-Willamette Valley. Northwest Sci. 35: 65–67.
(4) Irgens-Moller, H.
1955. Forest-tree genetics research: *Quercus* L. Econ. Bot. 9: 53–71.
(5) McCulloch, W. F.
1940. Oregon oak—tree of conflict. Amer. Forests 46(6): 264–266, 286, 288.
(6) Tarrant, Robert F.
1956. Forest soils of the Pacific Northwest. Soc. Amer. Foresters Proc. 1955: 73–76.
(7) Tucker, John.M.
1953. Two new oak hybrids from California. Madroño 12: 119–127.
(8) Whitford, H. N., and Craig, R. D.
1918. Forests of British Columbia. Canad. Conserv. Comn., 409 pp. Ottawa.